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DERIVATION OF THE FORMULA ON P. 96, VOL. III, VIZ.;

$$R = r \times \frac{(n+1)N + (n-1)r^n}{(n-1)N + (n+1)r^n},$$

where r is an approximate value of $\sqrt[n]{N}$ and R a much nearer approxima'n.

Let $N = r^n + a$, then, by the binomial formula,

$$N^{\frac{1}{n}} = r \left(1 + \frac{a}{nr^n} - \frac{(n-1)a^2}{1.2.n^2r^{2n}} + \frac{(n-1)(2n-1)a^3}{1.2.3.n^3r^{3n}} - \&c. \right).$$

Beginning with the term $a \div nr^n$ and reducing to a continued fraction and stopping at the second term of the cont'd fract. gives approximately

$$\frac{\frac{a}{nr^n} - \frac{(n-1)a^2}{1.2.n^2r^{2n}} + \&c.}{1} = \frac{1}{\frac{nr^n}{a} + \frac{1}{\frac{2}{n-1} + \&c.}} = \frac{2a}{2nr^n + (n-1)a};$$

$$\therefore R = r \left(1 + \frac{2a}{2nr^n + (n-1)a} \right) = \frac{2nr^n + (n+1)a}{2nr^n + (n-1)a}.$$

Substituting for a its value $= N - r^n$,

$$R = r \times \frac{(n+1)N + (n-1)r^n}{(n-1)N + (n+1)r^n} = N^{\frac{1}{n}} \text{ nearly.}$$

R. J. ADCOCK.

SOLUTIONS OF PROBLEMS IN NUMBER SIX, VOL. IX.

SOLUTIONS of problems in No. 6, Vol. IX, have been received as follows:

From Florian Cajori, 422; Geo. E. Curtis, 419, 421; Prof. H. T. Eddy, 420; Geo. Eastwood, 422; Prof. A. Hall, 420; Henry Heaton, 419, 420, 422; Charles V. Kerr, 419; E. H. Moore, Jr., 419, 422; Levi W. Meech, 418; Thos. Spencer, 419; M. Updegraff, 419.

Prof. J. W. Nicholson sent elegant solutions of prob's 411 and 416, but his letter was accidentally misplaced, hence they were not included in notice of solutions in No. 6.

418. *By Levi W. Meech, A. M., Norwich, Conn.*—"Required to express Lagrange's Theorem in terms of Finite Differences, as far as practicable, instead of the usual differentials."

SOLUTION BY THE PROPOSER.

Let θ denote an auxiliary, such that Lagrange's Theorem may take the form of the definite integral: